GeoTargeting Social Services

Leveraging Spatial Analysis to Optimize the Efficacy of Child Welfare Service Planning and Delivery

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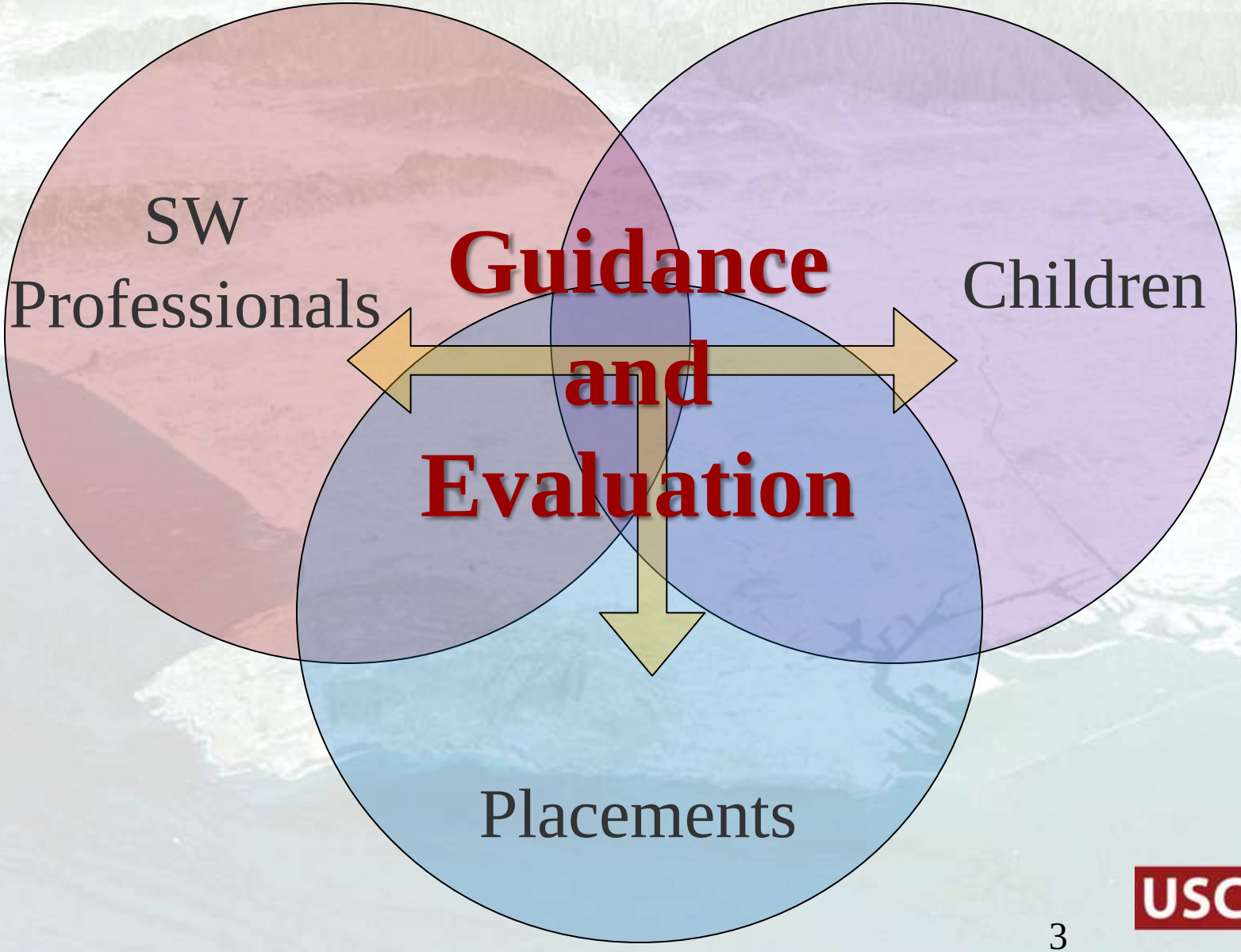
Project Motivation

- Several options may be available when a child must be placed in the care of DCFS - OR
- Several children may need to be placed and the number of placements may be limited

- Social work professionals must balance
  - Maximizing delivery of services to meet child-specific needs
    - Access to services in **appropriate languages, for specific disabilities, for specific health, mental health and education needs**
  - Overall DCFS resources
    - Equitable, efficient, and effective utilization of DCSF services

- The key is to optimize the location of child placement by maximizing
  - Safety, permanence and well-being of
    - any specific child in DCFS care AND all children in DCFS care
  - Utilization of DCFS resources

The Context


SW Professionals
Children
Placements
Guidance and Evaluation

The Challenge(s)

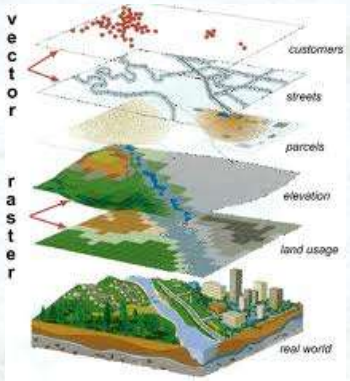
- How can we quantitatively define and compute measures of "Quality of care" (QoC)?
  - What aspects of a child placement affect the quality of care they receive or perceive?
    - Distance from child's parent/family
    - Location within or distance from child's school district
    - Access to specialized services (languages, special needs)
    - Proximity to public transportation
    - Proximity to visitation centers and sites
  - Which aspects can be objectively measurable?
    - Geographically-based (distance, availability)

The Challenge(s)

- How can we use QoC metrics to predict an optimum child/placement?
  - It is unknown what demand will be
    - Number of children
    - Characteristics of any specific child (history, language, disability)
  - The supply is always changing
    - DCFS resources (close, move, merge)
    - DCFS employees with specific skills (come, go)
    - Transportation variability (freeway closures, bus lines shut down)

Opportunities

- Geographic metrics are important indicators of quality of care
  - Distance to parent (transportation costs)
  - Remaining in the same school district
  - Proximity and accessibility to specialized services (transportation costs)
  - Classic GIS site-suitability selection modeling



- Geographic metrics can be derived in advance of a child/placement to rank available options
  - Merging **GIS research and modeling** to enable **research-based, data-informed decision making**

- But what are the geographic criteria that matter?

Enabling an Evidence-Based Approach – Defining Model Criteria

- Convene a meeting of experts to:
  - Identity, rank, and weight QoC criteria
    - $\langle x_1, x_2, x_3, \ldots x_i \rangle$ are each of the *i* criteria
    - $w(x_i)$ is the weight for the *i* th criteria
    - $r(x_i)$ is the rank for the *i* th criteria

$$x_{dist} = \sqrt{(a_1 - a_2)^2 + (b_1 - b_2)^2}$$

  - Understand annual caseload characteristics
    - Number of children
    - Frequencies of specific types of needs (languages, handicapped services, etc.)
  - Understand annual DCFS resource variability
    - Frequency of specialized staff turnover
    - Frequency of closing, opening, merging, etc.

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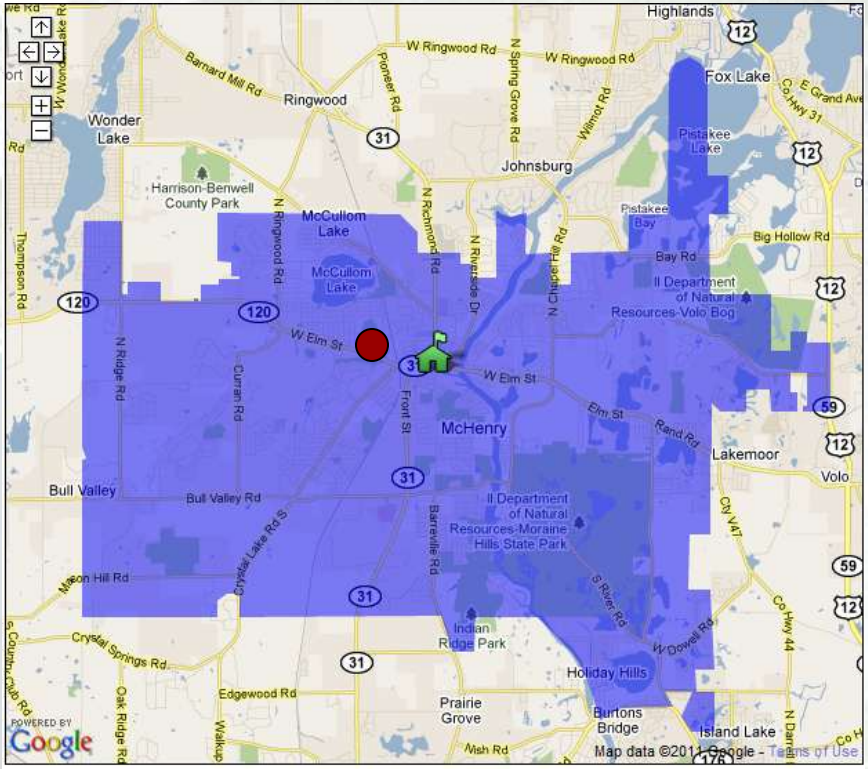
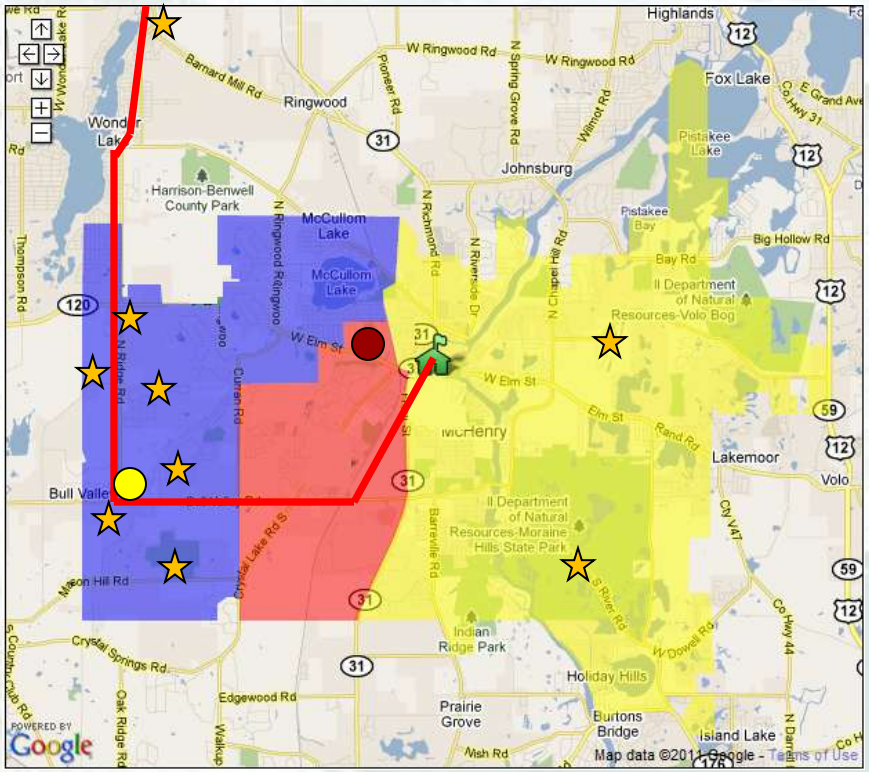
Informing Better Placement Choices



● - Placement that is closest to school

★ - Sites and services that are important for child



● - Placement in same school district
- On the bus line to parent
- On the bus line to a visitation sites/centers
- Close to specialized services

Criteria which would not be immediately obvious just looking at distance to school alone

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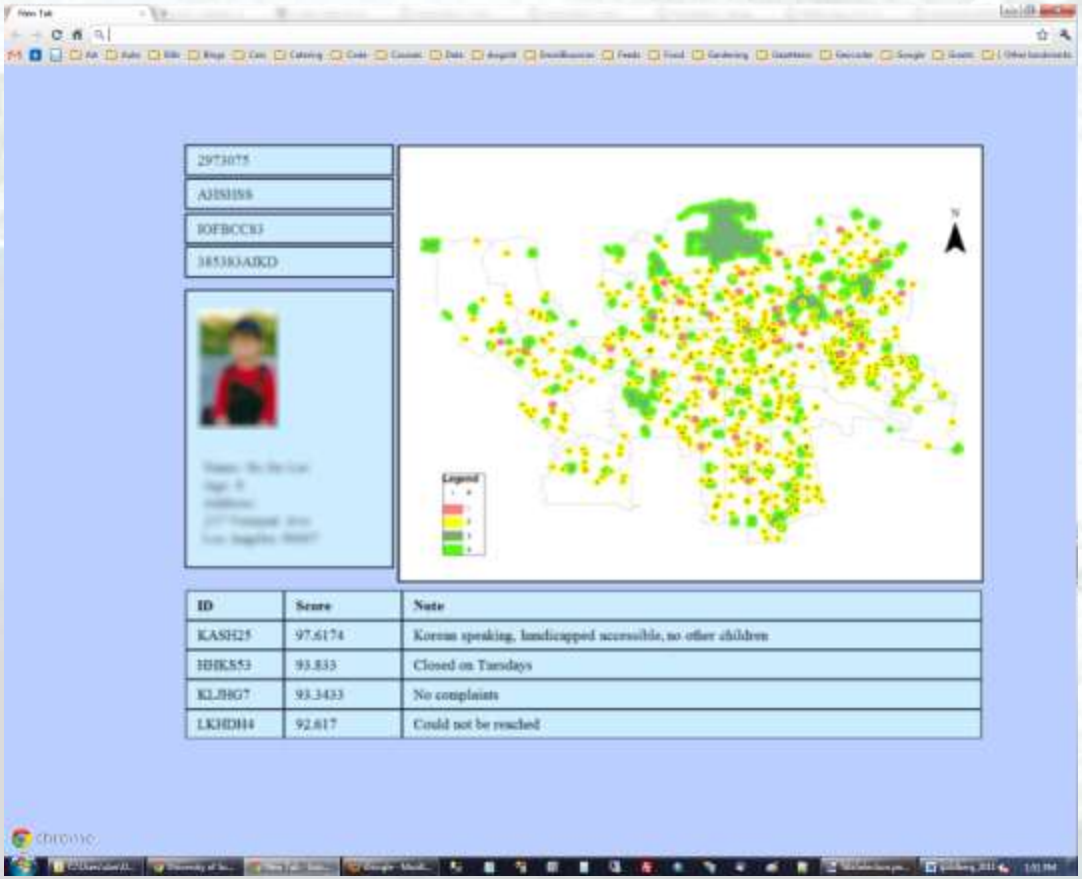
Model Construction

- Build a model to rank placement options given:
  - A set of j placement options, $p_j \in P$
  - Snapshot of the state of DCFS resources (locations, services, availability)
  - Child-specific criteria
    - Languages, special needs, school/parent locations
  - For a specific child c_i and a specific placement options $p_j \in P$
    - The placement rank should be a function of the sum of the $\langle x_1, x_2, x_3, \ldots x_i \rangle$ criteria that are applicable for the child and the degree to which x_i is satisfied for the child, $d(x_i)$,

Travel distance | proximity to parent | Same school district

$$F(c_i, p_j) = \sum \frac{1}{r(x_i)} * w(x_i) * d(x_i), \forall p_j \in P$$

Model Application – Ranked Placement Options



- Each potential placement will be ranked in order of QoC
- Can be used as a guide for placement selection
- Standard weights
  - determined by a group of experts
- Ability to change weights
  - based on what is important for a specific child

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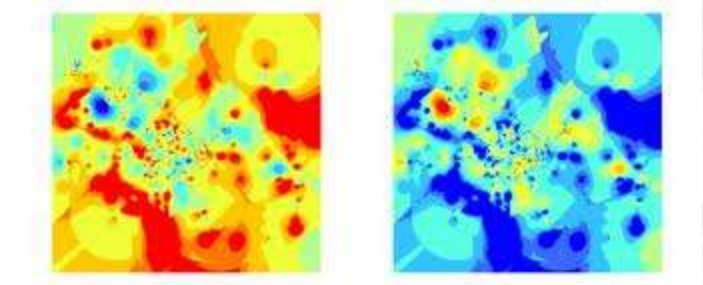
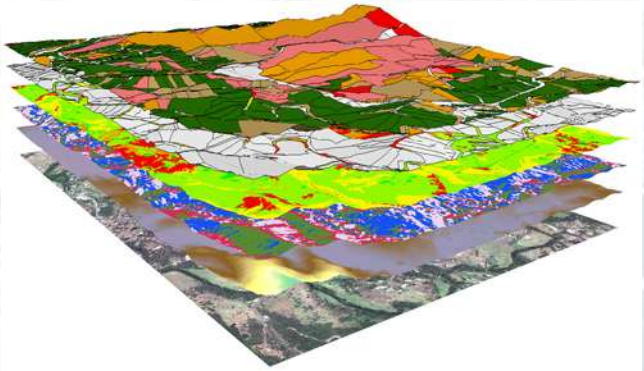
The Plan (continued)

- Evaluate the system:
  - Synthetic demand data set (cases)

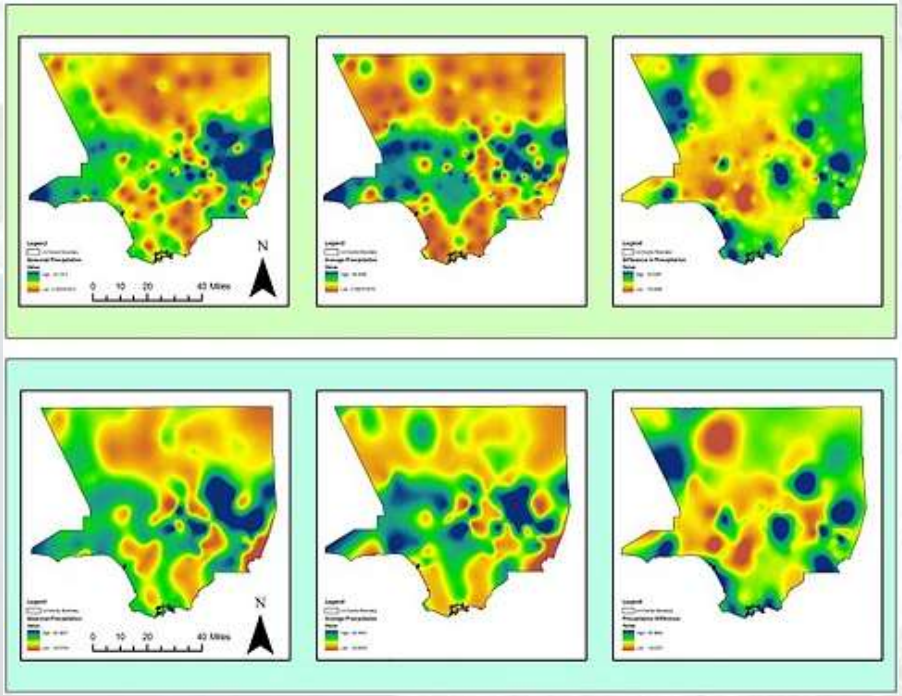


  - Synthetic supply data set
    - DCFS resources
    - Transportation networks
    - Street closures

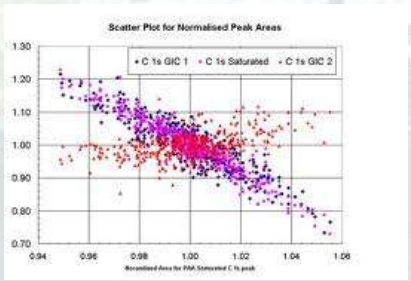


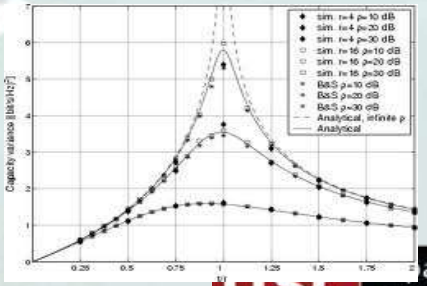
  - (Monte-Carlo trials)
    - Per-child criteria evaluation
    - System-wide criteria evaluation
      - Average child evaluation
      - Resource utilization

Model Evaluation – County-Wide Metrics



- Each model run will produce a different County-wide utilization pattern
- Can derive confidence intervals for model predications from the variance between these outcomes





Next Steps

- Engage professionals to help develop the model
  - Academic researchers
  - DCFS professionals
  - Identify which criteria are important and at what levels
- Build and evaluate the model and system on simulated data
- Incorporate real-world data from DCFS to build a better model
  - Facility locations
  - Caseload characteristics
  - Outcome data
    - To show that better placements bring down the length of time a child is in DCFS care

Project Team

- Project Partners
  - Laura Abrams (UCLA)
  - Bridget Freisthler (UCLA)
  - Jacquelyn McCroskey (USC)
  - Gokul Mandayam (USC)
  - Loc Nguyen (UCLA/IUC)

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Questions?

Comments?

Suggestions?

Volunteers?

Questions?

THANKS FOR LISTENING